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M.S. Dissertation in Engineering

**A Study of Smartphone Addiction
among Adolescents in Mongolia**

July 2017

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A Study of Smartphone Addiction among Adolescents in Mongolia

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이 논문을 공학석사 학위논문으로 제출함

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Abstract

A Study of Smartphone Addiction among Adolescents in Mongolia

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Although high technology has created many new advancements and services through the population, besides the dark side has appeared in society. The dark side of modern IT technology is having an impact on daily life of youth in several ways including, personal information security problem, overuse, cyber bullying and etc. Adolescents use a smartphone to communicate with their family and friends, to provide their security as well as to obtain a new information and qualitative education however at the same time they are addicted to a smartphone.

This study aims to determine factors that influence smartphone addiction the most among the Mongolian adolescents using the regression analysis method. Previous studies show numerous influencing factors based on socioeconomic, psychological and personal characteristics, however this study has the differentiation that is focused on social factors in Mongolian society. The smartphone addiction is possible to be measured by Smartphone Addiction Scale

in the research area. The participants, who are aged 13-17, own a smartphone at least two months use. In order to examine and understand the overuse of a smartphone, this study investigates influencing factors that are adolescents' base on empirical data gathered from a personal interview survey.

In Mongolia, the survey was conducted in 21 randomly chosen general educational schools and focused on the students of middle school and high school classes in the year 2016. The thesis was conducted by the empirical study, which included 383 participants, and was analyzed by Ordinary Least-Squares Regression Method. The study was examined by the link between family, school, the use of a smartphone, the awareness of smartphone addiction and compulsive behaviors. The study result suggest that the smartphone addiction is an epidemic problem among Mongolian children especially in the Capital City.

By understanding these influencing factors, Mongolian Government Agencies and policy-makers could make a decision and implement planning against to smartphone and internet addiction among adolescents. Lastly, this study gives a rational explanation and suggests policy guidelines on the problem of smartphone addiction for three levels.

Keywords: Use of smartphone addiction, Internet addiction, Adolescents, Teenager, Mongolian Society, usage of smartphone, IT policy of addiction

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Chapter 1. Introduction

1.1. Introduction

Nowadays, the smartphone is rapidly becoming everyday usage of people. The smartphone is the combination of the functions of mobile devices and handheld computers into a single device. Advantages of smartphones include multi-functional, quickly communicated, internet access anywhere, new innovation, educational provide, business support and etc.

The main utilization of smartphones is to communicate with other people in an easier and faster way that does not depend on distance. In an emergency situation, people can call an ambulance, police or fire station very quickly and time is so crucial in these kinds of situations that few seconds can make differences.

There are some useful features in smartphones such as checking emails, booking flight tickets, taking a picture, making online purchases, being aware of their locations to prevent themselves from being lost or getting stuck in traffics. We use smartphones to receive some government service without going to the office ourselves, provide feedbacks about their service quality and get involved in the government activities. Smartphones also support multi-functional activities such as checking the weather while listening to music and make notes and search a contact number while having a conversation. Children use smartphones to expand their knowledge by reading books, listening to online courses, learn new foreign language words, and improve listening and writing skills. Whenever they

need search something online they just need to get a hold of their phones.

Recently, entrepreneurs and business people have been using smartphones to conduct their business affairs successfully. Bankers suggest their customers to use smartphone apps to check transaction history, pay loans and make payment for purchases. Office workers can easily manage their work using smartphones without going to their office and still get paid for it.

The average spending time on a smartphone per day is increased by every year. According to a 2016 report, user's the average spending time is augmented 10 minutes compared to 2015, and 24 minutes compared to 2014. The reason why people spending more time on the mobile application than before. In another study, respondents' the average spending time was 3.03 during weekdays and 4.07 during weekends (Kwon M, Kim D, Cho H, Yang S, 2013). Mostly, the young generation is using a smartphone and social network actively.

Table 1-1. Average Time Spent per Day among US Smartphone Users¹

	2011	2012	2013	2014	2015	2016	2017
In-app	1:04	1:40	2:28	2:51	3:05	3:15	3:23
Smartphone	0:35	0:56	1:24	1:35	1:43	1:49	1:52
Tablet	0:29	0:44	1:04	1:16	1:22	1:27	1:31
Mobile web	0:29	0:38	0:50	0:51	0:51	0:51	0:52
Tablet	0:15	0:19	0:24	0:25	0:26	0:27	0:27
Smartphone	0:14	0:20	0:26	0:25	0:25	0:25	0:24

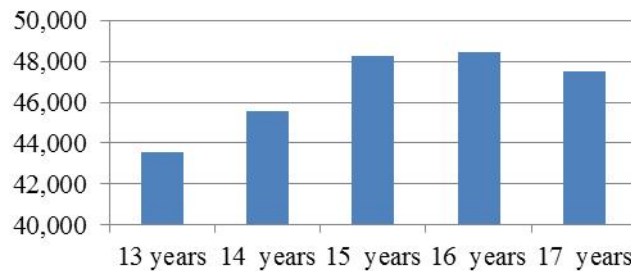
Note: ages 18+; time spent with each device includes all time spent with that device, regardless of multitasking; for example, 1 hour of multitasking on a smartphone while

¹ eMarketer, Oct 2015

on a tablet is counted as 1 hour for smartphone and 1 hour for a tablet.

In Mongolia in 2016, there are 1,049,230 children and 35% or 233,347 of them are adolescents (aged 13-17). Teenagers, who are aged 13-17, use the smartphone more often than other age segments.

Fig 1-1 the Number of Adolescents in Mongolia, 2016²

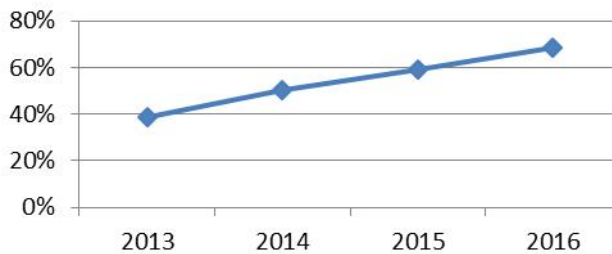


The technology adoption has been tremendous in mainstream consumer markets in developed and developing countries. Mongolia has four Mobile Communication Service Providers that provide services, in the Capital City, 21 Provinces, and 335 Soums (Villages) throughout the country- a coverage area of about 95% of Mongolia. In 2015, number of mobile telephone subscribers has reached to 5.0 million; however, the number of active user accounts for about 3.4 million and has stabilized at this number. There are 2.5 (81%) million internet subscribers, 2.4 million mobile data users, more than 2.36 million smartphone users and about 76% of the population use smartphones in Mongolia (ICT Statistic data, 2016). Since 2015, the percent of smartphone users has increased with 22% in 2016 in Mongolia. The years 2013-2016 was the peak period to adopt smartphone through the population and the penetration speed of smartphone

² NSO, National Statistic Organization 2016

will tend to decrease gradually year by year due to most of the population are using a smartphone.

Fig 1-2 the Percent of Smartphone Users, 2016³



The penetration rate of the smartphone is very high, the dependency of smartphone increases at the same time. The smartphone is powerful technology and interesting because it includes many utilities that used in every day. Parents provide their children with a smartphone in order to educate them and to communicate with each other. But from other side, they encounter the risks like harming health, wasting time, abusing by others in the online world, getting improper information and becoming the victims of sexual harassment. The excessive usage of smartphone among young adults and adolescents becomes the main problem of the society. Adolescents do not perceive the harmful damage of smartphone when used numerous hours a day. Also, their knowledge about smartphone addiction is a most encountering problem.

The researcher investigated that the addiction rate among adolescents was 18% and the approximately one-fifth child are addicted to a smartphone in South Korea (National Information Society Agency, 2012). This rate shows smartphone addiction will be one of the huge issues in the future world. Some

³ CRC, The Report of ICT Statistic data 2016

government officers said the plans to provide nationwide counseling treatment programs for children and adult by the next few years and train teachers on how to deal with addiction.

1.2 Research Motivation

The Mongolian Information Technology, Post and Telecommunications Authority (ITPTA) officially announced the year of 2016 as “The year to promote information security, and the appropriate use of the internet”. The Government of Mongolia did not provide any steps to develop the appropriate use of technology before. And now, the Government is working to take several operations to protect children in an online environment. For example, the Mongolian Government and Mobile Operator Companies introduced the new service named "Control of Parents". This service enables the parents to control the sites that are watched by their children and limit inappropriate channels. The small percent of (about 2%) the internet users take this service (Cyber Environment Forum, 2016) and there is no information how to use this service.

Addiction problem causes the cyber bullying among adolescents in online. Cyber bullying may cause to others mental disorders or depression for adolescents at a critical time, including dropping out of school and attempting suicide as friends who had not been victims. The most harmful problem of smartphone addiction is “suicide”. An adolescent strongly think about suicide when he/she is depressed among online environment because many peers simultaneously cause a soul pressure on her/him.

Mongolian Police General Department reported that 92 children

committed the suicides caused by depressions, violence, discrimination, coercion and harassment in the last four years. According to the study, more than 20 children committed suicide due to online harassments. According to data from the World Health Organization in 2015, Mongolian suicide rate is ranked by third place among 183 countries and moving up 62 places from 2011. The adolescent suicide is highly increased by last several years and boys have a higher suicide rate than girls.

On 16 September 2016, the Mongolian Minister of Education, Culture, Science and Sport has issued a Decree regarding on some measures, which touched the use of smartphones in secondary school environs. The Decree instructs the following guidances:

- School administrators and teachers are obligated to make a contract with parents regarding on their children's proper use of smartphone to prevent children from screen addiction;
- Organize training to make children and parents aware of health issues, caused by the excessive use of smart devices;
- Prevent children from being victims of any offense and violence;
- Obligates school heads to question students about income inequality and treatment problems caused by the use of different electronic devices and make rules in school regulation based on their feedbacks;
- Not allow both general educational, university and college students to use the smartphone during lessons in order to focus their attention only to

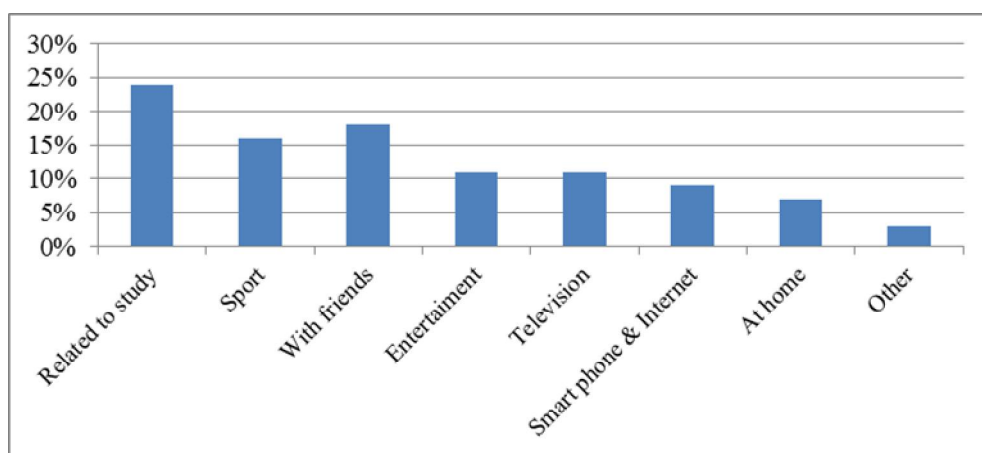
lessons and to improve students' study quality.

- Teachers and students are allowed to use smartphones only during breaks and out of class.

But most of them hide their smartphones or use an additional smartphone even during lecture. Teachers and school social workers usually remind about children's smartphone at schools. Most of them pick up their smartphone in a basket to keep during lecture. The Social Research and Information Center has investigated favorite things that children do in their leisure times. The research results showed that children favorite actions are watching TV and connecting to the internet via their smartphones.

Fig 1-3 the Ways of spending free times among

Adolescents⁴



In order to solve this problem, the collaboration of the Government, Public Media Organizations, Non-Governmental Organizations, Private Sectors, Schools, parents, and children are needed since it is not only a problem of an

⁴ Protect Children in Cyber Environment Forum, 2016

organization and a person. Especially Mongolian National Broadcasting Company (MNB) is facing to provide the appropriate usage among children through the population because MNB has the responsibility to deliver current information to young people to prevent from illnesses.

Unfortunately, there are still no significant studies, related to the smartphone addiction in Mongolia. Researchers need to determine the children's term of using mobile and factors that influence to using a smartphone in a long term and what policy is required with this problem. The Government should conduct a smartphone addiction survey at the national level, especially among teenagers. This research has a distinctive point for IT policymakers, who are able to reduce smartphone addiction than the previous study.

1.3 Purpose of the Dissertation

The aim of this study work is to define the smartphone addicted rate (not national level) and influencing factors Mongolian among adolescents based on a personal interview questionnaire. The study differentiation includes family, school adjustment and the awareness of smartphone addiction variables in Mongolian society. The study contains three main objectives.

- Firstly, to investigate the addiction rate among children aged 13-17. The

smartphone addiction is can be measured by the smartphone addiction scale and which are based on previous studies. This study uses a short version of smartphone addiction scale questionnaires for adolescents (Kwon M, Kim D, Cho H, Yang S, 2013).

- Secondly, to investigate the influencing factors that causes addiction to a smartphone. The significant factors include family and school, the use of smartphone and the awareness of smartphone addiction characteristic. By determining the significant factors, further actions will be provided.
- Thirdly, to find a way to improve current situation based on the study results and to deliver some recommendations for targeted groups of the population on smartphone addiction. The Mongolian Government is not able to implement an action to solve the issue without an understanding of the recent situation of smartphone addiction.

Chapter 2 Literature Review

2.1 Smartphone Device

Smartphones are carried everywhere: such as in bed, at the restroom, at work, at restaurants, etc. Therefore, smartphone devices are different from other mobile or technical devices, as they are extensions of the human being (McLuhan, 1964). A high technology smartphone contains so many of useful technology, which is a computer, mp3 player, camera, wireless the internet, touch screen, headset, various applications, voice calling and text message. Smartphones are having an impact on society in many ways including time usage, privacy issues, and constant accessibility (Rainie & Keeter, 2006).

Most important innovations of the 21st Century is Bluetooth, Apple iPod, Mozilla Firefox, Skype, Facebook, YouTube, Android OS platform, iPhone and iPad, 4G and Self-driving car (Telegraph, 2016). The smartphone is the most innovative product, which includes all of these inventions. In 2007, Apple Inc. introduced their first touch screen phone “iPhone”, as well as Google introduced the first Android phone respectively. Since then, much of the modifications are made in the smartphone world for short time, and the smartphone became everyday common usage of human beings. The open source Android technology plays an important role to build smart devices during last time period as it provided a great opportunity to all software developers and entrepreneurs. Currently, as the penetration of mobile phones in society’s increases, many

smartphone users have high-speed internet access with enough processing power to quickly download the apps, sending huge sized files.

2.2 Smartphone Application

The mobile applications support a much wider range of activities than desktop applications and leverage information about the user's environment to provide novel capabilities. From a technology perspective, mobility shifts the global computing infrastructure from static, homogenous, powerful desktop computers to highly dynamic, heterogeneous, resource-constrained handheld and wearable computers. This new computing context demands entirely new software architectural paradigms that address the challenges of mobile software development, are specialized for the nature of mobile devices and wireless networks, and take advantage of the opportunities afforded by mobile systems (Haeng-Kon K, 2013). Nowadays users would prefer to use the application on smart devices rather than an application on desktop and laptop.

The main reason to addict in a smartphone is the attractable applications. The content producers develop many applications every day, even though millions of apps are running out by users. But users are still loyal at several applications (SNS, game) and these applications are constantly insist.

In the United States, the average active application statistic shows that a smartphone user uses about 26.7 applications and spends on smartphone applications to 2,451 minutes every single month (eMarketer report, 2015). In the

United States in June 2016, 20 percent of mobile application usage time was spent on SNS in this month. Music including streaming services such as Pandora or Spotify accounted for 16 percent of mobile app usage time. Gaming app was spent 12 percent of total app time, Multimedia and Instant messengers accounted for 12 percent of mobile app usage time (Statista Inc, 2016). The smartphone users are considering a few applications such as social media, instant messenger, gaming and music application.

Another survey shows during a month in South Korea, a smartphone user spent time on various app categories. 50% of total app time was spent on gaming apps, 16% of total app time was spent on Social Networking Site, 13% of total app time was spent on Multimedia, 11% of total app time was spent on another app, 9% of total app time was spent on utilities and tools app, and 2% of total app time was spent on music app in August 2013 (Statista Inc, 2013). The smartphone users are considering so many applications such as gaming and utility apps.

2.3 The Usage of Smartphone

The reason why the percentage of smartphone user penetration is high, it requires no special training to use and able to use all generations. The previous study shows that smartphone usage patterns have differences that depend on social culture, education level, geographical location, nationality, and gender. Furthermore, the smartphone users use the different applications during the different period of a day. For example, news and email application are much more

repeatedly used in the pre-lunch, sports and social media applications more repeatedly used in the evening (Qiang X, Jeffrey E, Alexander G, 2013). Some apps are more frequently used and are spending more long time.

Facebook has become the most popular social media tool, which has about two billion active users connect each other recently. The majority of those users use to connect via smartphones and smart devices. Also in another study made in United States, social media tools effect on developing smartphone addiction (Salehan and Negahban, 2013).

2.4 Internet Addiction

Addiction is a term that means compulsive physiological need for and use of a habit-forming substance (like heroin or nicotine), characterized by tolerance and well-defined physiological symptoms upon withdrawal; it has also been used more broadly to refer to compulsive use of a substance known by the user to be physical, psychologically, or socially harmful (Maddux and Desmond, 2000). An addiction leads to an immoral habit and health problem regardless social, education, gender, age and a person's psychological characteristics.

First Kimberly Young introduced the definition "internet addiction disorder" (IAD) and founded the Center for Internet Addiction. First K. Young defined three subdomains of internet addiction: excessive online gaming, online sexual pre-occupation and e-mailing/texting (Young K.S, 2009). Currently, several numbers of the internet addiction research works are conducted and its

types are the smartphone addiction, gaming addiction, media addiction, cybersex addiction and social media addiction. The internet addiction is a behavioral addiction and not substance dependence. K. Young created the 8 question diagnostic Questionnaire with modification of the criteria for compulsive gambling (DSM-IV). Those who answered “yes” to five or more of her items were classified as being addicted to the Internet. These 8 items can define internet addiction easily. The significant findings from this questionnaire prompted the development of a larger and more comprehensive instrument.

2.5 Smartphone Addiction

Smartphone addiction is overuse among certain smartphone users. The World Health Organization is defined overuse as “dependence syndrome” (WHO, 1964). A person dependencies and checks his or her smartphone for a long time are called smartphone addiction. Internet addiction is closely related to smartphone addictions because the features are similar (Kwon M, Kim D, Cho H, Yang S, 2013). Nowadays, the smartphone addiction is more harmful and popular than Internet addiction. The smartphone includes small screen, the internet, millions of interesting applications and everywhere it can. The percentage of internet addiction was 7.7%, which was investigated to be lower than the smartphone addiction of 8.4% (Internet Addiction Survey, 2012).

Smartphone addiction creates three basic consequences which are health, psychological and social problems as the internet addiction (Jeongmin L, 2015). Firstly, health issue includes visual and hearing problem, obesity and turtleneck. Secondly, the psychological issue includes anxiety, nervousness, depression and lack of attention. Thirdly, the social issue includes wasting time, offline relationship (avoid real interaction) and distracting activity in life.

2.6 Behavioral Addiction of Smartphone

The common characters of the addicted people are easily distracted, cannot be separated from the devices, constantly check their phone in every five or ten minutes with no serious reason and feel impatient when they do not hold their smartphones. The habituation of smartphone usage and loss of self-control make users excessively depend on smartphone and therefore become threats to daily living function (Ko K, Lee M, Kim Y, 2012).

Smartphone addiction behavior can include an intense focus on the smartphone or a specific application, for example, checking, posting, or interacting on social media platforms (Kwon M, Kim D, Cho H, Yang S, 2013). The addicted person gets in shock or panic situation when he/she is not able to use her/his smartphone. Addicts often want to relieve stress and escape from the reality (Young K.S, 1999). Researchers argued that a behavioral pattern presenting addictive use is similar among the technologies, although technological features and their capabilities are different. The symptoms of

behavioral addiction are similar to other types of addictions.

The smartphone addiction is lighter (easy to be treated) addiction than other substance addiction such as drugs and alcohol. Drugs addictions are not behavioral addictions; rather, these but are termed substance dependence (American Psychiatric Association, 2001). The following symptoms cited in APA Diagnostic Classification DSM-IV-TR are common to all addictions:

- Tolerance building: more and more is needed to fulfill a person's needs;
- Withdrawal: when a substance or action cannot be performed, anxiety or unpleasant feelings arise;
- Loss of control: behavior is not in control anymore;
- Preoccupied with the addiction: other activities, such as recreation, social activities, and work are planned around the addiction;
- The time planning, doing, and recovering from the addiction is controlling life.

It should be noted that not every addict will have all symptoms or signs, as these could differ per person (Isaac X, 2008).

2.7 Smartphone Addiction Scales

Early children who are between 2-8 ages could not respond the special questionnaire without someone's help. So, it can measure the smartphone addiction of early childhood by their average smartphone using time a day. But for adolescents, the difference is it is possible to measure their smartphone

addiction by scales in the research area. There are several smartphone addiction scales which are approved by previous studies.

- SAS: Smartphone addiction scale (SAS) consist of the six factors which is withdrawal, tolerance, overuse, positive anticipation, daily-life disturbance and cyber-oriented relationship. SAS include 33 items with a six-point Likert scale (1: “strongly disagree” and 6: “strongly agree”) for all aged people. SAS was South Korea without any rule of study design in 2011 (Kwon M, Kim D, Cho H, Yang S, 2013). However Cronbach’s alpha is 0.96, 33 items are required more time to achieve results.
- SAPS: Smartphone Addiction Proneness Scale (SAPS) is based on previously published internet addiction scales and smartphone addiction scale. SAPS are self-report scale with 15 items and consist of four subdomains which are a disturbance of adaptive functions, virtual life orientation, withdrawal, tolerance. And also it is scored on a four-point Likert scale (1: “not at all” and 4: “always”). SAPS are the result of collaboration Department of Education, Seoul National University and Department of Education, the Korea National University of Education in South Korea (Kim D, Lee Y, Jee J, Nam JK, Chung Y, 2014).
- SAS-SV: The Smartphone Addiction Scale Short Version is a short version of the smartphone addiction scale and the evidence of its validity in adolescents. And also it suggested cutting off the values by gender in order to determine. SAS-SV have been selected 10 out of 33 items and

based on SAS, SAPS, and KS-scale on a 6-point Likert scale (Kwon M, Kim D, Cho H, Yang S, 2013). SAS-SV consists of the five factors which are withdrawal (4Q), tolerance (1Q), overuse (1Q), daily-life disturbance (3Q) and cyber-oriented relationship (1Q). This study used SAS-SV and it is shorter and only for adolescents than other measurement scales. Total score of the scale ranges 10 to 60 and the sum of the score from 1 to 10 questions can define smartphone addiction. The sum of score indicates more than 34.02 in people who considered themselves addicted to smartphones.

2.8 Adolescents

World Health Organization identifies adolescence as the period of human growth and development that occurs after childhood and before adulthood, from ages 10 to 19. Adolescents are different both from young children and from adults. Specifically, adolescents are not fully capable of understanding complex concepts, or the relationship between behavior and consequences, or the degree of control they have or can have over health decision making including that related to sexual behavior. This inability may make them particularly vulnerable to sexual exploitation and high-risk behaviors. Adolescents depend on their families, their communities, schools, health services, and their workplaces to learn a wide range of important skills that can help them to cope with the pressures they face and make the transition

from childhood to adulthood successfully.

During adolescents' period time, teens are faced with many issues such as tobacco, drug, alcohol, internet, and smartphone addiction. Among smartphone users, adolescents have the usage of smartphone significantly higher than other age groups. According to the Korea Communications Commission, the adolescents are 2.9 times more addicted than adults. Adolescents could be more addicted due to they cannot handle their habits. Further, the smartphone addiction of teenagers would be a huge problem.

Parents, members of the community, service providers, and social institutions have the responsibility to both promote adolescent development and adjustment and to intervene effectively when problems arise (World Health Organization).

2.9 Related Study

Previous studies showed that the gender of the children was the main factor of the addiction. The boys are more likely to watching TV, playing an online video game and using the internet. Girls are more addicted to a smartphone because they usually use the social network (SNS), shopping, Instagram, camera application and instant messenger (Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I, 2014). Gender is a significant predictor of smartphone and internet addiction, although some studies failed to find a significant relationship between woman and man on technological addiction.

People often forget how to interact face-to-face because they use technology as a crutch to avoid true interaction (Tessa Jones, 2014). They have to comprehend that live relation is adequate than online relation. To process the policy for children, the study has to analyze their information about addiction and activities for protecting from addiction.

2.10 Policy on Smartphone Addiction in the World

In recent years, there are numerous countries have identified their smartphone addiction studies and policies, and Asian countries have a serious epidemic especially South Korea, China, Taiwan, Singapore and Hong Kong.

In South Korea, the smartphone addiction, the dark side of information technology is becoming a critical problem. The public and private sector, schools and communities are continuously taking the steps to reduce the spread of internet addiction. Korean government adjudged that children who are under 16 years old are cannot be connected networks and the online game between 10PM and 6AM. Parents are also able to make a request to their IT providers company to prohibit the access to the internet in order to prevent internet addiction. The Korean government started implementing the financial and technical activities to decrease internet addiction rates are reported in the “2013 National Informatization White Paper”.

In Australia, 95% of the population uses the Internet and the number of

smartphone addiction users is increasing every year constantly. Australia is one of the world's most advanced ICT countries according to the annual report from the ITU. The Australian Government has introduced the Cabin Sydney, the world's first treatment center for screen addicted patients. The highly experienced doctors of that center recommend a free primary health care service and offer a hierarchy medical program among their patients (The Cabin Sydney, 2016).

According to CCTV's website, China already has an estimated 300 Internet addiction centers and there may be more than 24 million young Chinese addicted to the Internet. China reported the psychological risk factors of addiction to social networking sites by investigating outcome expectancies (Wu AM, Cheung VI, Ku L, Hung EP, 2013).

The Japanese health ministry released a report that, based on questionnaires sent to 264 schools nationwide, estimates 6% of a junior high school student and 9% of senior high school students are in a state of "Internet dependency." Too much screen time has been linked to obesity, sleep problems, depression and more. To combat the problem, Japan has introduced Internet fasting camps where children who are deemed Internet-addicts will participate in outdoor activities and get appropriate counseling in an unplugged environment (Net Addiction, 2013).

Chapter 3. Research Method and Design

The purpose of the research is to define associated factors of the smartphone addiction among adolescents by asking questionnaires. The significant factors are trying to find between family, school, the use of a smartphone, and the awareness of smartphone addiction characteristic. The questionnaires were taken from the adolescents that used their own phones at least two months.

As with any research project, research workers face many challenges in order to collect data and this period is extremely important. These activities include the accuracy, the efficiency of data collection and the cost of the selected data collection method. There are four main types of survey to collect data for the empirical study through the e-mail, phone, online and face to face interview. Each method contains the different features that depend on the research objectives and specific needs. The advantages of the e-mail, phone call, and the online survey make the respondents easy, quick and low-cost responds. But the disadvantage of those types of the survey is that response rates are typically low, the samples are limited and reliability is not high.

A face-to-face interview is one of the oldest and most widely used methods for conducting primary researches. There are several advantages of using face to face interviews, such as the response rates are high, the researchers can observe person's attitude and respondents can be probed for explanations of responses. But the cost of the collection data is high and the data collection period

requires a long time. Face to face interview is the best way to collect data for children as well as the researcher can explain every single question. In the case of this survey, the face to face interview was used, due to the target respondents are children. Especially addiction scale items are not easy to understand for 13 or 14 years old adolescents.

The scientific research process is a systematic methodology for informing policy decisions. Six basic steps to success are required in research area (Hair J, Black W, Babin B, Anderson R, Tatham R, 2006):

- First step: Define the objective goals of the problem background. The point of the process is finding the core questions that needs to be informed by the research and selecting the particular factors and variables. By understanding the research problem clearly, the final research result will be effective and fruitful.
- Second step: Determine the research design (survey, target group, and geographic area) and hypothesis related to the goal of the study. If a hypothesis is well-defined, the topic is certain and clear. The core of the step is to help narrow down focus and study basics necessary to go deeper.
- Third step: Collect the sample data for analysis process to check the acceptability. The part of the process is a time when the survey is conducting and distributing the interview or online on various channels.
- Fourth step: This step is to make sure in the model of path diagram. After accumulating enough data, analysis and calculate the collected data using tools and a statistical software.

- Fifth step: Summarize the defined hypothesis verification results based on the collected sample data.
- Sixth step: Conclude the structural model of the study. Demonstrate the research question and recommend the result of analysis based on the analysis against to critical problems.

3.1 Proposal

The study aims to determine what factors mostly influence smartphone among Mongolian adolescents. According to previous studies, most of the research in this area is based on the psychological and personal characteristics. This study has the differentiation that is considered in the family, school, and the use of smartphone and the awareness of smartphone addiction characteristic in Mongolia. After understanding the factors of the smartphone addiction, IT policy makers can implement further necessary actions in Mongolia.

Research Question 1: What is the main factor that influences on smartphone addictions significantly among adolescents?

Research question 1.1: How does the family factor (the number of family members, parental marital status, paternal and maternal education, family income, the permission of parents) influence on smartphone addiction among adolescents?

Research question 1.2: How does the school factor (joining the club after school, school rule, satisfaction with peers, academic achievement, and discriminatory attitude) influence on smartphone addiction among adolescents?

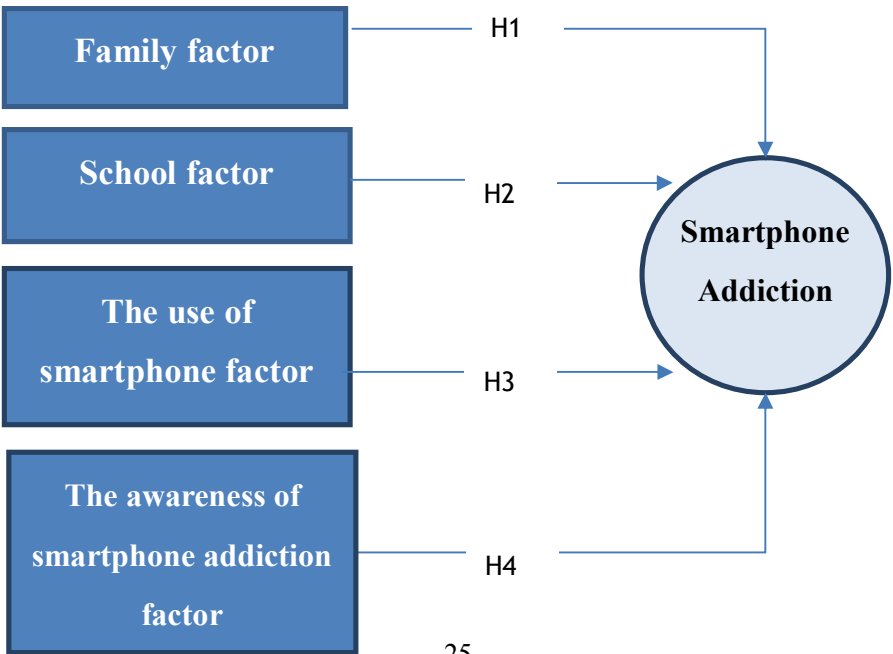
Research question 1.3: How does the use of smartphone factor (the usage time of smartphone, the usage of social media, the purpose of smartphone use and cyber bullying) influence on smartphone addiction among adolescents?

Research question 1.4: How does the awareness of smartphone addiction factor (the awareness of negative effect, the awareness of experience, participation in training) influence on smartphone addiction among adolescents?

3.2 Research Model and Hypothesis

The model is consisted of five types of factors: factor, school, the use of smartphone, the awareness of addiction and Smartphone addiction factor. This research used a newly created model of determinants that can examine the smartphone addiction among adolescents. The research model was proposed based on previous literature review.

Fig 3-1 the Smartphone Addiction Model



Hypothesis 1: The family factor has an impact to smartphone addiction among adolescents

Busy life of parents and different level of family incomes influence on smartphone addiction among adolescents. Based on above review, parent's education level and income have a significant impact on internet addiction (Heo, Oh, Subramanian, Kim, Kawachi, 2014). When parents' income is low, they do not have leisure time to spend with their children, so their children are lack of control. If children do not have control, their smartphone addiction might be high. On the other hand, the lower family income can not impact on smartphone addiction, because the smartphone is one of the expensive tools. Average household salary is about 400USD in Mongolia (NSO, 2015). This average salary is not sufficient to buy a high-quality brand smartphone. Children are easily addicted to an expensive smartphone that has a lot of functions to spend more time.

With the increasing level of the parental and maternal education and the family income, the score of addictive smartphone use is significantly decreased (Heo, Oh, Subramanian, Kim, Kawachi, 2014). When the educational level of the parents is higher, the child's addiction level to a smartphone is lower (Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I, 2014). The family effect is influenced their smartphone addiction significantly (Yong-Sook K, Ji-Young P, 2013). The parent and maternal education level are more likely high-level, the rate of addictive to a smartphone is reduced (Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I, 2014).

The divorce of parents can be a factor that influences to the addiction,

because of parentless children and child of a single parent has psychological problem (Daniel T et al 2012). There are 34,060 children who are parentless and half orphan and 3% of them are aged between 0-16. In 2014, 2329 couples signed in divorce documents and it is increased than previous years with 13.4%. This percentage is the increased than the previous year by 28.1% (NSO, 2015). The parentless children use the smartphone more than other children because they are in lack of love and care from their parents. Also, the relation between parents and adolescents plays a major role. The children can be an addicted on smartphone although parents live together if they could not spend time with their children (Wookjoon S, 2016).

In another way, too much care of the parents could influence on their addiction. Young children could be more addicted because they cannot handle their habits. Some of the parents do not permit their children's daily smartphone usage unlimitedly and that can be an effective method (Cheol P and Ye Rang P, 2014). Parents can see that their lack of smartphone knowledge and their permission to use smartphone is the main factor of the addiction. Smartphone addiction among adults is mainly influenced by family relationship factors rather than by social factors (Wookjoon S, 2016).

The number of the sibling or the family member is one of the factors that influence on the addiction. Mongolian families have averagely 2-4 children. In 1953, there were average six children in the family, however in the recent years, the number of the children was decreased (NSO, 2015). The decreasing number of the children can be affected by many factors, but that can be one of the major

factors that influenced on the addiction because of their loneliness (Cheol P and Ye Rang P, 2014).

Hypothesis 2: The school factor has an impact smartphone addiction among adolescents.

School environmental factor, though, it is well known that parental socioeconomic status (SES) and school characteristics are associated with risks of adolescents' addictive behaviors (Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I, 2014). The Wi-Fi internet at school and permission to use the internet could be an influencing factor of adolescent addiction.

There are 742 primary schools and 149 of them are private schools and 590 are state schools. 10% of total school children attend private school. The teachers of private school tightly control their students and phone usage at school is prohibited and these are highly influenced on children's addiction (Daniel T et al, 2012). Higher academic rate and school adjustment significantly predicted a lower level of pathological use of the internet (Daniel T et al, 2012). School adjustments such as making peer relationships and keeping school rules are also affected by smartphone addiction. Adolescents answered that the school regulation and the satisfaction of peers effected on their mobile phone usage (Jang S. H, 2010).

Previous studies showed that children who are aged 10 to 17 and not attended at school were 8% in Mongolia (Open Society Forum, 2010). They have no information about smartphone addiction and another type of addiction

and that can be also addiction factor (Wookjoon S, 2016). There are not enough activities and sport centers after school and that can be addiction factor. Spending active free time of the children can protect from smartphone addiction too (Cyber Environment Forum, 2016).

Morill added that the younger population have become the primary users of cell phones in America, and “the value and meaning of a cell phone for an adolescent will most likely carry strong social implications within their peer group (Morrill T, 2009). Satisfied with peers relationship of adolescents are related to their addiction. Those who do not have satisfaction, usually have an experience extreme fear and anxiety frequently.

Academic achievement was inversely associated with addictive (Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I, 2014). Spending much time to achieve the high score at school positively effects to their addiction.

Also, the price difference between phones handles the approaches. Children who use the costly phone are more famous than others more likely to be addicted to their phone. This study is trying to find the social effects on smartphone addiction in high school students using the school adjustment variables.

Hypothesis 3: The use of smartphone factor has an impact smartphone addiction among adolescents.

Thirdly, the smartphone usage factor (e.g., time spending on the Internet and the purpose of using the Internet) were found to significantly relate to

smartphone addiction status (Wookjoon S, 2016).

Addicted users spent twice time on their phone and launched applications much more frequently (nearly twice as often) as compared to the non-addicted user. Mail, Messaging, Facebook and the search application can be a cause of excessive consumption. Surprisingly, games did not show any difference between addicted and non-addicted users. Addicted users showed significantly lower time-per-interaction than did non-addicted users for mail, Facebook, and messaging applications (Chad T, Philip K, Clayton S, Ahmad R, Lin Z, 2015).

Also the number of friends on their social network influence on addiction. More friends and more "like" s are the addiction factor. If addicted children use their phone in the early morning, during the meal, during class and on the bed, it could be a serious problem. And there would be a health problem if they use their phones while going home and crossing the road.

Hypothesis 4: The awareness of smartphone addiction factor has a negative impact on smartphone addiction among adolescent.

Fourth, among the addiction treatment/prevention factors, awareness of addiction and experience of addiction counseling services are found to positively relate to prevention of smartphone addiction. In the adult group, simply being aware of the fact that overuse of smartphone can lead to addiction helped to prevent addiction (Wookjoon S, 2016). Children who are not aware of their smartphone usage has a negative effect on their health. Most of them know very well but they do not use the awareness when using a smartphone. They do not

conceive using smartphone for many hours as a threat or a disease because they are satisfied it when they're using them. In other words, they are acutely seeking out specific media and content to satisfy.

Education is the main key to success in our life. The children are the significant subjects to protect themselves from immoral habit. They have to know how to deal with the problem by themselves. Information about smartphone addiction can be the main method for addiction prevention. Parents, teachers, and friends can be the information source of the negative side of addiction.

3.3 Survey Participants

The sample size needs 384 participants when the confidence level is 95%, the confidence interval is 5%, and the population is 233,347. The at least 384 children who are aged between 13 and 17 is needed the participants in the study in order to decrease standard error. The participants of the survey are targeted who have been on a smartphone at least two months in the recently. They are selected by their parents' education, income level, the school grade, age and the smartphone usage level by chance

The objective of this research is to designate their addictive smartphone and the influencing factors. The participants of the survey are targeted who have been on a smartphone at least two months in the recently. They are selected by their gender, school type, parents' education, income level, the school grade, age and the smartphone usage level by chance.

3.4 Measurements of Variables

1) Dependent Variables

A dependent variable is the smartphone addiction scores that measure the Smartphone Addiction Scale Short Version questionnaires in adolescents. Addiction factors consist of the five variables which are withdrawal (4Q), tolerance (1Q), overuse (1Q), daily-life disturbance (3Q) and cyber-oriented relationship (1Q). Respondents have ten questions where they have to indicate on a Six-point Likers scale (1: “strongly disagree” and 6: “strongly agree”).

2) Independent Variables

In the present analysis, the questionnaire consists of four main factors were include are school, the use of smartphone, the awareness of smartphone and smartphone addiction. Control variables include gender, age, family income, the family members, the parent’s marital status, education level, school type;

(1) Family factor includes the number of family members, parental marital status, paternal and maternal education level, family income, the permission of parents;

(2) School factor includes school rule, joining the club after class, the satisfaction with peers, academic achievement, and discriminatory attitude;

(3) The use of smartphone factor includes the usage time of smartphone, the usage of social media, the purpose of smartphone, cyber bullying;

(4) The awareness of negative effect, the awareness of experience, participation in training about smartphone addiction;

3.5 Construction of Model

3.5.1 Ordinary Least Squares Analysis

In statistics, ordinary least squares (OLS) or linear least squares is a method for estimating the unknown parameters in a linear regression model, with the goal of minimizing the sum of the squares of the differences between the observed responses in the given dataset and those predicted by a linear function of a set of explanatory variables (visually this is seen as the sum of the vertical distances between each data point in the set and the corresponding point on the regression line – the smaller the differences, the better the model fits the data) (Hayashi et al, 2000).

First, Ordinary Least Square (OLS) model is built to estimate the determinants of the sum of addiction score on a smartphone. The simple regression is possible to measures that the amount of influence the independent variable has on the dependent variable. While simple regression shows the influence of on variable on another, multiple regression analysis shows the influence of two or more variables on a designated dependent variable.

$$\text{Multivariate: } Y = B_0 + B_1X_1 + B_2X_2 + \dots + B_KX_K + \epsilon \quad (3.1)$$

where Y is dependent variable and X_1, \dots, X_k are the other independent variables.

Empirical model is in its simplified form that is:

$$(SAS) = B_0 + B_1FF_1 + \dots + B_5FF_5 + B_6AGE + B_7GEN + B_8SCHT + \epsilon \quad (3.2)$$

where (SAS) that means the sum of smartphone addiction score and each variable in this equation contains related dummy variables. B_0 is estimated of the regression intercept and a constant parameter. B_6AGE , B_7GEN , B_8SCHT are the vectors of control variables, which comes a certain age, gender and school type (private or public). B_kFF_k is the vector of the number of family members, parental marital status, paternal and maternal education level, family income, the permission of parents. B_k is vectors of the constituent influence of related dummy variables. ϵ is a random error term in the regression equation which is defined as the effect of the variables that were omitted from the equation.

In another model, B_kSF_k is the vector of school factor, which comes to the satisfaction with peers, joining the club after class, academic achievement, school rule and discriminatory attitude. B_6SCHT is the control variable (school type).

In next equation, B_kUSP_k is the vector of the use of smartphone parameters such as the average spends time, the usage of social media, the purpose of smartphone use, and cyber bullying.

In last equation, B_kASPA_k is the vector which examines the awareness of negative effect, the awareness of experience, participation in training about addiction.

3.5.2 The Limitation of Model

The empirical models have some limitations that it is offered before examining the regression and generating the results.

- Firstly, the sum of smartphone addiction score is dependent on adolescent self-report measures. Since there is no another exact method of collecting data of overuse and the results should still be accurate in collecting data.
- Secondly, the evaluations are biased due to self-selection mechanism. There is no hesitation that the random error term in the model contains many unobservable, which affect the chosen variables. The problem with the selection adolescent is very complex and the omitted variables influence the chosen groups identically, and thus the results for those groups are comparable.
- Lastly, the collected data does not contain all information that represents whole national level. Researchers could not collect data from every single school or student, so I should try to get the data which have the lesser the error and the greater representative.

Unfortunately, the method includes all above mentioned limitations and researcher should consider the limitations to decrease standard error when measuring the result.

Chapter 4. Data Analysis

4.1 Data Collection

As explained from the previous section, this study is focused on identifying the perception of which adolescents use excessive usage on a smartphone. During the 14 days of the data collection period, the questionnaire was face to face interview between researcher and adolescents in the capital city. This survey was delivered to the special school for disabled children to take the survey. There are seven disabled respondents involved in the survey but this number could not affect the result.

Even though the researcher was trying to take the survey 453 adolescents, 41 adolescents do not own a mobile phone. Moreover, approximately 86% of the target group of adolescents uses a smartphone, 5% of the adolescents use simple cell (the internet disconnectable) phone and 9% of the adolescents do not use any mobile phone. In the case of a private school, 100% of the adolescents own a smartphone.

The survey consisted of 39 items in total, the researcher asked every single question to adolescents aged 13 to 17 and filled out. All adolescents were assured that the questionnaire is anonymous and voluntary. A total of 390 responses were received and 6 eliminated due to less than 13 years old respondents. The data from 383 sample respondents was analyzed and measured against the established hypothesis. All conversation is collected and recorded by the researcher. OLS analysis was applied to analyze relations between family,

school, the use of smartphone, the awareness of addiction and SPSS software was used in this survey.

4.2 Demographic and Descriptive Statistics

Among 383 valid respondents, the difference in gender and age is a small number, and the highest percentage of the respondents 98% belongs to between disabled and not disabled group. In total 383 students filled out the questionnaire form which 201 were girls (52%) and 182 boys (48%) and respondent belongs to the age group 13 to 17.

Table 4-1 Demographic of Respondents

Measure	Items	Frequency	Percent
Age	Thirteen	84	22%
	Fourteen	72	19%
	Fifteen	87	23%
	Sixteen	75	20%
	Seventeen	65	17%
Gender	Male	182	48%
	Female	201	52%
Disabled	Disabled	6	2%
	Not disabled	377	98%
Parental marital status	No parents	21	5%
	Single parents	47	12%
	Double parents	315	82%
The number of family members	Two people	16	4%

	Three people	47	12%
	Four people	115	30%
	Five people	128	33%
	Six people	58	15%
	Seven people	11	3%
	Eight people	4	1%
	Nine people	1	0%
	Ten people	3	1%
School Grade	Primary school	1	0%
	Secondary school	150	39%
	High school	232	61%
School Type	Private school	47	12%
	Public school	334	87%
	University	2	1%
Parental Education	High school education	164	43%
	Bachelor's degree	185	48%
	Master's or Doctor degree	33	9%
Maternal Education	Primary school	2	1%
	High school education	127	33%
	Bachelor's degree	214	56%
	Master's or Doctor degree	40	10%
Family Income	Low	3	1%
	Middle low	62	16%
	Middle	150	39%
	High	168	44%
Total		383	100

The parental marital status in Table 4-1 shows that 6% of respondents do not have any parents, they live other caretakers. 12% of respondents have lived single parents, 82% of respondents have lived two parents. It means single parents more tend to increase than last several decade years. According to the report of National Population and Housing Census Survey 2010, the number of female head of a household is 21.5% of all households; the average number of Mongolian family is 3.6; by the population census in the half of 2010. In this survey, the average people number of Mongolian family is 4.6 (mean) and families that consist of 4-5 members accounted for 63 percent of total households.

In another report, 10% of total school children attend private school (NSO, 2015). In this study, 12% of the total school is a private school, 88% of the total school is a public school.

Generally, the high percentage of children's parental education level (91%) is High school and Bachelor's degree. The low percentage of parental education level (9%) is Masters or Doctor Degree. In the maternal education level case, the most of children's maternal education (66%) are Bachelor, Master, and Doctor Degree, but High school and Primary school degree are 34%. Children's maternal education higher than paternal education when those two variables are compared each other.

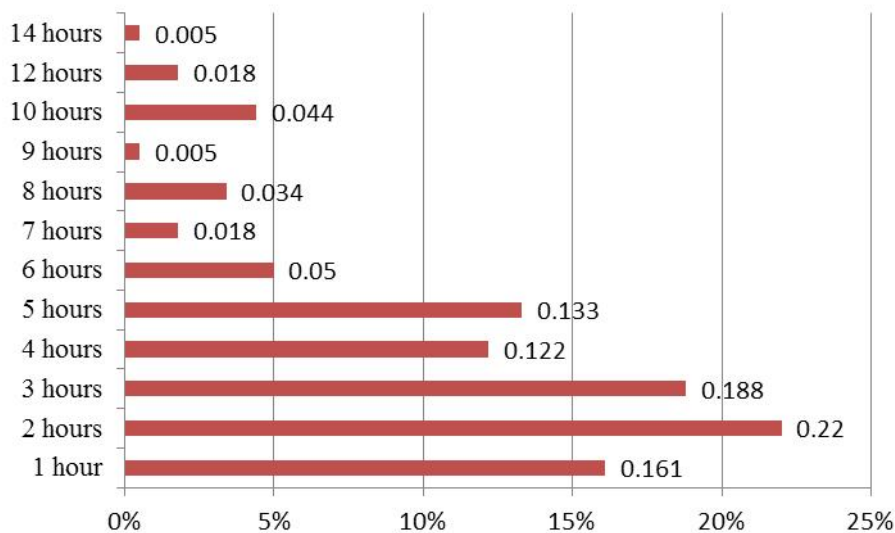
The poverty level estimated at 29.8 percent (World Bank, 2012). For this survey results, 17% of the family have a less middle-income level, there is the high difference between questionnaire that taken by adolescents and the World Bank poverty level statistical result due to children do not know their household

income.

4.3 The Smartphone Usage and Descriptive Statistics

In another study, respondents' the average spending time was 3 hours 32 minutes among Korean adolescents (13-18 years old) on the Internet in during a week (Kwon M, Kim D, Cho H, Yang S, 2013). The average of spending time is 3 hours 40 minutes as well as girl's average spending time is 4 hours 15 minutes and boy's average spending time is 3 hours 10 minutes.

Fig 4-1 the Time Spending on Smartphone



Smartphone addiction is defined as spending more than seven hours a day using the phone and consequently experiencing withdrawal symptoms when

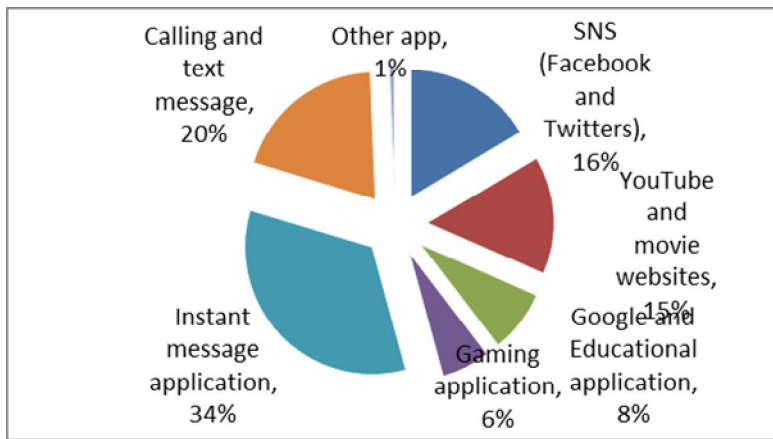
deprived of or cut off from the device (Addiction Research, 2013). By this definition, 11% percent of adolescents addicted 7 hours per day using a smartphone. The result was found that 13 years old adolescents use less time and have low addiction score than 17 years old.

Table 4-2 the Average Sending Time and Gender

Age	Usage time			Addiction score		
	Mean	Frequenc y	Std. Dev	Mea n	Frequenc y	Std. Dev
13 years old	3.0	84.0	1.9	27.2	84.0	7.7
14 years old	3.7	72.0	2.8	27.9	72.0	7.5
15 years old	3.8	87.0	2.3	28.6	87.0	8.0
16 years old	4.5	75.0	3.0	30.3	75.0	8.4
17 years old	4.2	65.0	2.9	29.4	65.0	7.9
Total	3.8	383	2.6	28.6	383	7.9

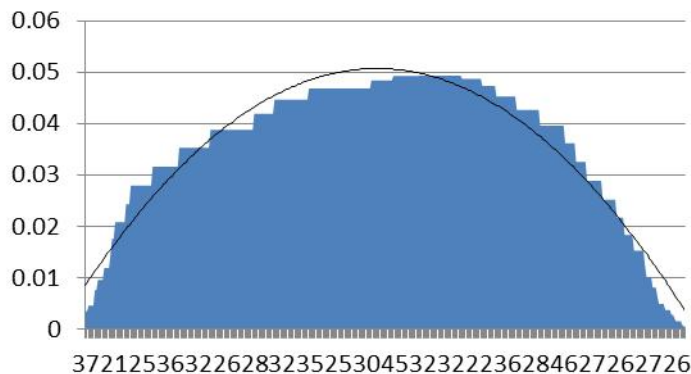
Facebook is very popular than other SNS in Mongolia. Most of the participants (50%) are using instant messenger and SNS instead of talking to people. Not surprisingly, they spend most of the time on Facebook and chatting apps due to their psychological process and personality development may be particularly vulnerable to increasing addictive behaviors. Surprisingly, 6% of adolescents use gaming apps that are not popular among adolescents.

Fig 4-2 the Usage of Application on Smartphone



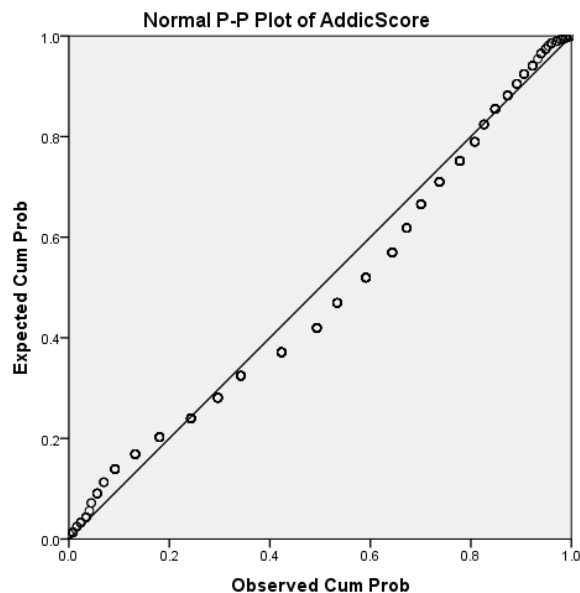
Descriptive statistics are designed to give us information about the distributions selected variables. Within this general category are measures of central tendency that are Mean, Median, and Mode; are measures of variability and normality around the mean that are Standard Derivation, Variance, Sleekness and Kurtosis; are measures of the distribution spread that are Maximum, Minimum, and Range. Descriptive statistics is possible to illustrate the basic features of the data and trying to reach conclusions in a study briefly.

Fig 4-3 Normal Distribution of Addiction Score



Normally distribution of the dependent variable is very important to analysis the statistical data. In this study, the dependent variable is normally distributed and the mean score is 28.6 (Std. error=0.4, Std. Deviation=7.9, Skewness=0.583, Kurtosis=0.249). The dependent variable is dummy variables, therefore their minimum and maximum are from 10 to 60. Increasing of the sum of smartphone addiction score is more likely happen in adolescence and teenager. The disabled young respondents are more likely to addict but the number of respondents is not enough to impact significantly. Probability plot graphic helps us to compare two data sets in terms of distribution. Generally, one set is theoretical and one set is empirical.

Fig 4-4 Normal P-P plot Addiction Score



4.4 Regression Analysis Results

Regression analysis involves identifying the relationship between a dependent variable and one or more independent variables. A model of the relationship is hypothesized, and estimates of the parameter values are used to develop an estimated regression equation. Various tests are then employed to determine if the model is satisfactory. If the model is deemed satisfactory, the estimated regression equation can be used to predict the value of the dependent variable given values for the independent variables (Encyclopedia Britannica, 2000).

4.4.1 Regression Analysis on Family Factor

The addiction score is compared with family factor using statistical analysis software SPSS, even though all variables have different scales or metrics. Table 4-3 shows variables which are gender and age have a significant impact on smartphone addiction. In terms of the other variables do not have relationship or impact on smartphone addiction significantly. Generally, girls had much higher risk of addictive smartphone use compared to boys. According to another study of US college undergraduates, girls claimed that spending time on their mobile phones has signified a day than boys. They are consumed by more chatting and using social media sites (Roberts et al, 2010). In addition, this table shows that increasing age in adolescent tends to demonstrate more smartphone addiction behaviors.

Table 4-3 Regression Analysis on Family factor

Model		Unstand. Coef		Stand.Coeff	t	Sign.
		B	S. Err	Beta(β)		
Family variables	(Constant)	8.94	7.01		1.28	.20
	Parental marital status	.45	.78	.03	.58	.56
	Paternal education level	-.66	.84	-.05	-.78	.44
	Maternal education level	-.20	.83	-.02	-.24	.81
	Family members	.42	.33	.07	1.25	.21
	Family Income	.22	.56	.02	.40	.69
	Permission of parents	.35	.52	.04	.68	.50
	Age ***	.84	.29	.15	2.85	.00
	Gender .	1.41	.83	.09	1.70	.09
	School type	1.28	1.20	.06	1.07	.29

***Significant at 0.001, **Significant at 0.01, * Significant at 0.05, Significant at 0.1,

The model explained 2% of the variance ($R=.215$ and adjusted $R^2=.023$).

R-squared is a statistical measure of how close the data are to the fitted regression line. In general, R-squared is the higher, the better the model fits my data. Unfortunately, this model ($R^2=.046$) could not explain the variability of the response data around its mean. The model was significant ($F=2.005$, $p=.038$), where F-ratio represents the ratio of improvement in prediction as a result of fitting the model relative to the inaccuracy that still exists in the model (Field A, 2009). Hypothesis 1 is supported as β value (intercept=8.94) is positive and is not rejected ($p<0.05$). The standard error is estimated 7.842.

4.4.2 Regression Analysis on School Factor

School adjustment is defined as the feeling of satisfaction with rationally solving an individual's desire for a subject, class activity, extra-curricular activity, etc., and having harmonious relationships with teachers and peers (Min B.S, 1991). School adjustment is negatively correlated with smartphone addiction such as school rule, learning activities, peer relation and teacher relation (Jeongmin L, 2015).

Table 4-4 Regression Analysis on School Factor

Model		Unstand. Coef		Stand. Coef	t	Sign.
		B	Std. Err	Beta(β)		
School	School type	1.799	1.148	.082	1.56	.118
	Satisfaction with peers .	-.942	.543	-.090	-1.73	.084
	Joining club after class .	-.515	.288	-.092	-1.78	.075
	Academic achievement	-.318	.665	-.025	-4.78	.633
	School rule *	1.100	.541	.104	2.03	.043
	Discriminatory attitude	.133	.675	.010	.198	.843

*** Significant at 0.001, ** Significant at 0.01, *Significant at 0.05, Significant at 0.1,

Satisfaction with peers, joining the club after class, school rule variables are significant variables in this survey. Interestingly, the adolescents who have higher satisfaction with peers are more likely to be addicted to a smartphone than lower satisfaction with peers. The reason is adolescents have a higher chance of

contact each other and have a lot of friend's relationship when they use their smartphone. The adolescents who are not attending any clubs after class at school have higher smartphone addiction rate and they have more time at home without any parents' control.

In the previous study, keeping school rules negatively predicted smartphone addiction (Jeongmin L, 2015). Conversely, the school rule variable is positively predicted smartphone addiction in the survey. Because highly addicted adolescents have more restrictions from their teachers and school than other. Most of the secondary schools have a rule to not use a smartphone during attending a school in Mongolia. Concurrently, school type, academic achievement, and discriminatory attitude variables do not have a strong relationship with smartphone addiction.

The model explained 2% of the variance ($R=.195$ and adjusted $R^2=.023$). R-squared is a statistical measure of how close the data are to the fitted regression line. In general, R-squared is the higher, the better the model fits my data. Unfortunately, this model ($R^2=.038$) could not explain the variability of the response data around its mean. The model was significant ($F=2.47$, $p=.023$), where F-ratio represents the ratio of improvement in prediction as a result of fitting the model relative to the inaccuracy that still exists in the model (Field A, 2009). Hypothesis 2 is supported as β value (intercept=27.18) is positive and is not rejected ($p<0.05$). The standard error of the estimate is 7.844.

4.4.3 Regression Analysis on the Use of Smartphone

The average spending time per day, the purpose of smartphone use and the cyber bullying variables are significant variables in this survey. Surprisingly, the adolescents who are using educational apps and websites do not have addiction behavior. The reason is adolescents have already adapted to the appropriate use of smartphone. Cyber bullying is a significant variable in the study due to adolescents use a smartphone so many hours per day. Students who were involved in cyber bullying were more likely than others to report perpetration of violence toward peers, to use computers for more hours a day, and to give their password to friends (Faye et al, 2011).

Table 4-5 Regression Analysis on the use of smartphone factor

Model		UnStand. Coef		Stand.Coeff	t	Sign.	
		B	S. Err	Beta(β)			
The use of smartphone	Constant		21.53	1.46		14.67	.000
	The average spending time ***		.645	.149	.215	4.32	.000
	The number of friends SNS		.000	.000	.065	1.27	.204
	The purpose of smartphone use	SNS **	2.76	0.94	0.16	2.93	.004
		YouTube	-0.66	0.90	-0.04	-0.73	.468
		Edu app **	-3.17	1.15	-0.13	-2.76	.006
		Gaming app	-1.16	1.29	-0.04	-0.90	.369
		Messenger *	1.55	0.81	0.10	1.92	.05
		Call & Text	0.41	0.87	0.02	0.47	.636
Cyber Bullying **		1.79	0.61	0.15	2.94	.004	

*** Significant at 0.001, **Significant at 0.01, *Significant at 0.05, Significant at 0.1,

Concurrently, YouTube, the number of friends on SNS, gaming app, calling and text message variables do not have a strong relationship with smartphone addiction. The model explained 37% of the variance ($R=.079$ and adjusted $R^2=.119$) and it can explain ($R^2=.140$) the variability of the response data around its mean. The model was significant ($F=6.734$, $p=.000$), where F-ratio represents the ratio of improvement in prediction as a result of fitting the model relative to the inaccuracy that still exists in the model (Field, 2009). Hypothesis 3 is supported as β value (intercept=21.54) is positive and is not rejected ($p<0.001$). The standard error of the estimate is 7.94.

4.4.4 The Awareness of Smartphone Addiction Factor

The awareness of smartphone addiction factor does not have any relationship with smartphone addiction behavior. People around of the adolescents always tell them that they use their smartphone too much. Addicted adolescents know about the serious problem of smartphone addiction but they did not control their addiction behavior themselves.

The model explained 2% of the variance ($R=.079$ and adjusted $R^2=.002$). R-squared is a statistical measure of how close the data are to the fitted regression line. Unfortunately, this model ($R^2=.006$) could not explain the variability of the response data around its mean. The model was significant ($F=.798$, $p=.496$) and hypothesis 4 is not supported as β value (intercept=31.41) is positive and is rejected ($p>0.05$). The standard error of the estimate is 7.94.

Table 4-6 Regression Analysis on the Awareness of Smartphone Factor

Model		Unstand.Coef		Stand.Coef	t	Sign.
		B	S. Err	Beta(β)		
The awareness of smartphone addiction	(Constant)	31.41	2.69		11.68	.000
	The awareness of smart phone addiction	.059	.507	.007	.12	.91
	The awareness of experience	-.681	.465	-.084	-1.46	.144
	Participation in training	-.128	.359	-.019	-.35	.722

***Significant at 0.001, **Significant at 0.01, *Significant at 0.05,Significant at 0.1,

4.5 Result Discussion

The model showed that the family factor (the number of family members, parental marital status, paternal and maternal education level, family income, and the permission of parents), the school factor (school rule, joining the club after class, the satisfaction with peers, academic achievement, and discriminatory attitude), the use of smartphone factor (the average spending time, the usage of social media, the purpose of smartphone, and cyber bullying), and the awareness of smartphone addiction factor (the awareness of negative effect, the awareness of experience, and participation in training about smartphone addiction).

The adolescents concluded themselves using a short scale of smartphone addiction scale, which consists of 10 questions and its cut-off value gender. Within a period of two weeks, the data was collected from 21 secondary schools

through adolescents who are aged between 13-17 years old. According to the results, 86% of adolescents are using a smartphone in daily life and 5% of them use simple cell phones (Internet disconnectable). 24% (addicted adolescents=93, the total respondents=383) of total respondents and 20% (addicted adolescents=93, the total adolescents=453) are more vulnerable smartphone addiction than other respondents.

The researcher interviewed every single adolescent based on face to face survey method and they tried to decrease the standard error and the limitation. This study developed four hypotheses and the data from 383 sample respondents was analyzed and measured against of the established hypothesis.

- According to following hypothesis 1 “The family factor has an impact among adolescents’ smartphone addiction” is not rejected by statistical analysis ($p=.038$).
- According to following hypothesis 2 “The school factor has an impact among adolescents smartphone addiction” is not rejected by statistical analysis. School characteristics such as making peer relationships, keeping school rules (Jeongmin L, 2015) and joining the club after class are also affected by smartphone addiction ($p=.023$).
- According to following hypothesis 3 “The use of smartphone factor has an impact among adolescents smartphone addiction” is not rejected by statistical analysis. The average spending time of smartphone a day, the purpose of smartphone and cyber bullying variables can be a factor that

influences to the addiction ($p=0.000$).

- According to following hypothesis 4 “The awareness of smartphone addiction factor has a negative impact on adolescent’s smartphone addiction” is rejected by statistical analysis. There are any relationship variables in this study ($p=0.496$).

This study found that the use of educational application adolescents significantly did not have smartphone addiction behavior. In the other hand, the government should provide educational application and the contents in the Mongolian language.

The awareness about smartphone addiction was negatively correlated with addiction behavior. In other words, the addicted adolescents well know about smartphone addiction, they could not control themselves and did not avoid their smartphone for a long time.

Chapter 5. Conclusion and Policy

5.1 Conclusion

The excessive usage of the smartphone has emerged as a significant social problem with growing popularity of smartphone and for this reason, I have purposed to fulfill this research. Besides of the investigations, I have put a goal to reduce the addiction of smartphone among adolescents. Thus, I have investigated the factors that lead to addiction of smartphone.

In the study results, 24 percent (n=93, respondents=383) of total respondents were addicted to smartphone and this does not represent the number of nationality level. In the case of population, 20 percent (n=93, adolescents=453) of total adolescents were addicted to a smartphone, when compared to the total number of adolescents because 86% of adolescent use their own smartphone. This number shows that smartphone addiction among adolescents is still a serious problem. The South Korean Government survey found that smartphone addiction rate is 18% among teens, and it is higher twice than adults, which counted as 9.1% by smartphone addiction rate (National Information Society Agency, 2012).

In additionally, 100% of the adolescents of Private Schools own smartphones and their addiction scores are lower than adolescents of Public Schools because the Private Schools organize various extra-curricular activities among students. Therefore, the Government and Educational institutions should develop various programs for educational extracurricular activities in order to

prevent children from smartphone addiction. Further researches should investigate the effects of personality on smartphone addiction instead of considering the social-demographic factors and the awareness factors of the smartphone addiction. The upcoming development of technology brings more addiction problems, so certain policies will be necessarily needed. The Treatment Center for Screen Addicted Patients is needed to be opened in the Capital City, where children receive personalized programs for helping them to avoid from smartphone and internet addictions.

Study results conceive that Government, Schools, Private companies and Public organizations for children are urgently required to pay attention on smartphone addictions among children.

Even as high school adolescents in Mongolia, who are supposed to have high academic pressures, they have the excessive use of smartphone. The smartphone addiction score can not affect on their academic degree. But parents can not monitor their children all the time even though they live together. Most of the adolescents are wasting their valuable times for smartphone.

This study is expected to contribute toward the empirical and theoretical background of smartphone addiction among adolescents and its relationship with their social and family environments. Since the proposed model and approach used is the first in this field, there were many limitations and disadvantages, which should be taken into account and improved upon in next research work. Nevertheless, the finding of the study is to provide several significant implications for ICT policymakers, related to adolescents in Mongolia.

5.2 Policy Implications

Smartphone addiction is a serious problem that consists of many factors. The Government also has to build new Rehab Centers for children and addicted adults. Even though the screen addiction is a relatively new threat, it can be treated rather easily compared to the substance, tobacco or the alcohol addiction. Currently, there are not enough medical experts in Mongolia so preparing professional doctors that specialized in screen addiction is urgently required.

5.2.1 Treatment of Screen Addiction

Smartphone addiction defines as Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). Firstly, parents have to know the treatment of screen addiction for adolescents in order to prevent from the smartphone addiction. According to Yeongcheol E, addiction treatment should consider eliminating negative thoughts and addicts' personal feelings and suggested the following four complementary treatments in order to overcome teenager's smartphone addiction and the psychological problem (Yeongcheol E, 2016).

1. Smart Phone Addiction and the Biblio Therapy

Biblio-therapy which is associated with smartphone addiction provides

treatment through reading literature (Gonzalez, 2015). The Bibliotherapy process is implemented by reading the book and finding new meanings from the literature based on the Identical Principle, Catharsis Principle, and Discernment Principle (Jing Q, Yong L, 2010). This method will divert teenager's attention to more productive activities and this way the children will manage to spend their time more productively.

2. Smart Phone Addiction and the Literature Therapy

The Literature therapy helps to be treated oneself the addiction through poems and music. The integrated literature medical treatment mainly incorporates media art treatment method to treat the patients. Taking these points into consideration, scholars of literature, education, and art suggested the need for the development of this program. Literature medical treatments that can harmonize the aspects of both cognitive and emotional treatments have the ability to treat addicted teenagers' cognitive and emotional illness (Yeongcheol E, 2016). Addicted children get very depressed after having their use of phone halted. It can be effective encourage them to write poems while listening to soothing music during the hard times.

3. Smart Phone Addiction and Music Treatment

Musical treatment, a type of emotional treatment, can be divided into

two categories. First, there is a musical treatment that can help treat physical and cognitive problems. This treatment provides psychological security to those being treated for physical and cognitive problems. Moreover, it is more effective if you have the subjects draw pictures of their childhood while listening to calm music. This can create a greater synergy effect through an integrated treatment (Sochensky R, 2001). Another way, the drumming class is very effective method to decrease addiction when other counseling services have failed. Drumming increases the recovery process and it helps to heal psychological warfare. Second, subjects can be treated with therapeutic song writing in order to decrease their addiction to smartphones (Yeongcheol E, 2016).

4. Integrated Treatment Process for Smart Phone Addiction

The integrated treatment process for smartphone addiction involves applying for examination of smartphone addiction. Subsequently, teenagers' addiction state is investigated and the appropriate treatment is implemented (Kim H, 2013).

- First Phase: Administrator and subjects make rapport formations and the administrator advises the type of treatment to the subject (Yeongcheol E, 2016).
- Second Phase: Subjects implement the integrated treatment method in order to overcome their illnesses such as depression, anxiety, and abnormality in their daily lives. Administrator provides data to the subjects that are placed through

integrated treatments such as physical, cognitive, and emotional providing feedback to the administrator afterward (Yeongcheol E, 2016).

- Third Phase: Administrators and subjects get together to find a method that prevents the subject from going back to their old conditions. At this point, the teenagers need to be placed in multiple programs to maintain the decreased level of stress and increased the level of self-control (Kim H, 2013).

5.2.2 Implications of Policy

Due to raising of addiction rates, the smartphone addiction requires carefully planned action by the Mongolian Information Technology, Post and Telecommunication Authority (ITPTA). ITPTA need to start working on White Paper report research on smartphone and internet addiction rates, including the reports and announcing it to the public. In the case of Korea, the National Information Society Agency initialized the survey, which aimed to measure the rates of internet addictions and to report on Informatization White Paper every year for public since 2004. It established the ‘Comprehensive Plan for Preventing and Reducing Internet Addiction’ based on discussions between the Government officials and relevant Ministries (Informatization White Paper, 2010).

The Government should develop the programs that include some methods above in consultation with medical social workers and associated experts. Policy actions are needed to be implemented on the academic institutions, parents

and children in accordance with their distinctions. The actions would be implemented by three phases.

1. Recommended Actions for High School Administrators and Teachers

Teachers and social service workers play important roles in protecting high school students from addictions (Yong-Sook K, Ji-Young P, 2013). The Government should initiate and prepare a Guidebook for parent-child relationship program in order to teach good habits for children. The guidebook and the program should have following ideas:

It is important to mention the advantages and disadvantages of using a smartphone in the curriculum and textbooks. Teachers and mentors need to deeply convince adolescents about bad consequences of smartphone addiction and possibility of success, if used properly. School administrations should recommend lists of smartphone applications that support learning and knowledge of adolescents. They also need to warn adolescents about applications that can cause addiction. For example, social media, messenger, gaming, pornography, entertainment and shopping applications lead to addictions. But e-learning, webs, and language learning application provide knowledge. With this reason, most of the addicted adolescents said they use social media and chatting app frequently.

Getting training or participating in a favorite (preferred) club can reduce effects on addiction. According to this study results, addiction rate of adolescents,

who participate in clubs (sign=0.075), is lower than those who do not. Spending many hours on smartphones is the least efficient use of leisure time. The survey results show that the average spending time in addicted adolescents is 4 hours 43 minutes and they usually use at home. So keeping them busy is the best way to prevent from addiction. School administrations should focus on making effort by providing opportunities such as sports, poetry, drum, dancing and book-reading club for adolescents to spend their time productively.

Apart from conducting programs to prevent addictions, they should advise adolescents on how to protect themselves from cyber-attacks, cyber-bullying and protect their personal information. This survey results show that Cyber Bullying is significant variable (Sig=0.004) to smartphone addiction. On the other hand, addicted adolescents are more likely to become victims of cyber-bullying than non-addicted adolescents due to their higher rate of the usage of the smartphone.

2. Recommended Actions for Parents

Even though parents live with their children, they cannot monitor what they are using. There are several efficient ways for parents to deal with it according to the previous researches.

These are:

- Get advice from specialist doctors and psychologists about how to spend

time without technology to tell their children later. According to this study, Girls are more likely to be addicted than the boys so their parents need to take special consideration in this matter. That is why because girls use social networks more often.

- Besides of the children, parents are also needed to control their use of the internet, which lead their children to addiction. Parents are less likely to pay attention to the children and they are less aware of this addiction due to lack of the education.
- Installing monitoring smartphone application on the children's phone is the most efficient way for parents to pay attention to their children's addiction. With these smartphone applications, parents can monitor that which applications they use for how long and determine their addiction level. These kinds of applications determine the children's addiction level based on their spending time on a smartphone. They also keep track of the daily or monthly use of applications and send an alert message to the parents' phones if the usage is high. These applications provide the possibility for parents to monitor their children's addiction level daily.
- Parents need to take their children to wild nature tour in order to keep them away from technology. It is crucial that these events take place under parents' supervision. Parents should be close to their children and should spend much time with their children to prevent children from addiction to a smartphone.

3. Recommended Actions for Adolescents

Besides of parents' and teachers' efforts, it is needed to accustom children to proper ways for spending leisure time, to educate children to protect from any addictions and bad habits. There are several efficient ways for children to protect themselves from addictions.

These are:

- According to this study, checking on their phones occasionally can usually lead to addiction. People, who check on their phones even when they did not receive any kind of notifications, are more severely addicted. To avoid from occasional check on phones, they need turn off notifications. If adolescents feel the urge to check on their phone, they can close their eyes, take deep breaths and wait for few minutes until the urge passes. Then they can attend to other things.
- The research also shows that the number of friends on social media directly affects the rate of addiction. According to study, the average number of friends of addictive adolescents is 1628. The number of addicted adolescents and the number of social media friends are dependant with on each other. So, children need to register as friends only those, who are actually close and familiar to it and to make unfriend any other unfamiliar friends.
- Adolescents should install only useful apps according to the lists, provided by their teachers and parents. They need to use those apps for a specific

period of time, not for an extended period. Addiction inducing apps such as social media apps need to be deleted from their phones.

- Before using the phone, they should look at the clock and schedule 5 to 20 minutes of use. Adolescents should use their phone time and should stop using smartphone immediately when this time is due. They need to accept the fact using social network make them lose track of time and they cannot try all those millions of contents on the internet.
- Instead of using the phone, focusing on their hobby is very efficient too. But the hobby must not involve the use of internet or smartphone. For example, they can help their parents cook and help them with household works. They can also meet friends outdoors and train the sports.
- The number of groups or pages on social media directly affects on the rate of addiction. The number of addicted adolescents and the number of social media groups or pages are dependant with each other. So, a young person needs to cut the group on social media.
- Adolescents should not use their phone, while it is charged. Also it is needed to keep the phones away, while sleeping time at night. People, who use phones while eating or lying in bed, have a higher level of addiction. So, experts suggest people not to use their phones before going to bed.

5.3 Limitation and Future Research

Research results showed that 24% of survey participants were determined as addicted. If this amount is compared to total number of children, 20% of children can be considered as addicted. But this data only represents the people in Ulaanbaatar City, not the entire country. Next research should be done covering all children in Mongolia at national level. In addition, this study did not use cross-validation analysis, which causal relation can not be inferred. Further study is possible to evaluate cross-validation analysis, confirming the accountability for Mongolian context.

This research shows that adolescents, who enlisted in this research, were not aware of their family income or did not want to tell honestly, so family income data was not done accurately. Family income data is very different from the data from family income survey by Mongolian Statistics Office. In next research, a more efficient Family Affluence Scale (FAS) method should be used, due to children usually do not know on their family incomes. The FAS is measured by summation of answers of four items: 1) having one's own bedroom (yes= 1, no= 0); 2) frequency of family trips per year; 3) the number of computers at home; and 4) the number of vehicles owned by family (HBSC, 2008).

This nationwide research was conducted only among children of the age of 13 to 17. The addiction problem equally presents among young generation and adults. Addiction rate of children was able to be determined by comparing to their parents' rate of using a smartphone. Because the main factor in children's

addiction is the characteristics of their parents' smartphone usage. Addiction rate among early children cannot be determined by questioning them but by observing how they spend their time.

A young adult, who is most addicted to a smartphone, is aged between 18 to 35. The online survey can be used to determine addiction level among adults. Policy actions should be developed to reduce addiction level among adults.

The survey results show that awareness of addiction among adolescents does not help with their situation. This is because they keep using smartphones for many hours even when they are aware of their bad consequences. Further researches should be focused on their personalities and psychological factors instead of trying to make them aware of the problem.

There have been a significant number of studies that was conducted with the aims to determine the factors that can cause addictions. But there is no research conducted to develop efficient programs to treat addictions. Researchers need to conduct extensive researches in actions developed and implemented by policy makers to fight against addictions among whole population.

As seen from the researches, the most harmful affect of smartphones and devices are cyber bullying in online environments. Children choose a suicide, when it receives much cyber bullying from peers in a same time. So, this problem should be carefully researched in every year and should be taken a measure in order to solve this urgent problem. In conclusion, parents and care-takers must never forbid children to use their smartphones and smart devices. Instead, they have to teach them the proper use of smart devices.

References

Addiction Research, (2013). Smartphone Addiction In the U.S. and South Korea.

Retrieved from : <https://www.addiction.com/3321/smartphone-addiction-us-south-Korea/>

American Psychiatric Association, (2000, 2001). Diagnostic and Statistical
Manual of Mental

Chad T, Philip K, Clayton S, Ahmad R, Lin Z, (2015). Exploring Smartphone
Addiction: Insights from Long-Term Telemetric Behavioral Measures.
International Journal of Interactive Mobile Technologies.
<http://dx.doi.org/10.3991/ijim.v9i2.4300>.

Cheol P and Ye Rang P, (2014). The Conceptual Model on Smart Phone Addiction
among Early Childhood. *International Journal of Social Science and
Humanity, Vol. 4, No. 2*

CRC, (2016). ICT Statistic data report in Mongolia. Retrieved from:
<http://www.crc.gov.mn/k/35/23>.

Cyber Environment Forum, (2016). Protect Children in Cyber Environment
Forum, Ulaanbaatar 2016. Retrieved from: <http://www.ikon.mn/n/nxe>.

Daniel T et al, (2012). Internet addiction in Hong Kong adolescents: profiles and
psychosocial correlates. *Walter de Gruyter. Berlin, Boston. [International
journal on disability and human development](#)*.

Disorders . Fourth Edition. Washington, DC: American Psychiatric Association.

eMarketer, (2015). Perspective on Attention Report. *EMARKETER INC*.

Encyclopedia Britannica, 2000, Regression analysis definition.

Faye Mishna, Mona Khoury-Kassabri, Tahany Gadallaa, Joanne Daciuka, (2011).

Risk factors for involvement in cyber bullying: Victims, bullies and bully-victims, Elsevier Children and Youth Services Review 34 (2012) 63–70

Field A. P. (2009). Discovering statistics using SPSS: Sage Publication

Gonzalez, V.M., Dulin, P.L, (2015). Comparison of a smartphone app for alcohol use disorders with an Internet-based intervention plus bibliotherapy: A pilot study. *Journal of consulting and clinical psychology* 83, 335

Haeng-Kon Kim, (2013). Architecture for Adaptive Mobile Applications.

International Journal of Bio-Science and Bio-Technology Vol.5, No.5 (2013), pp. 197-210 <http://dx.doi.org/10.14257/ijbsbt.2013.5.5.21>

Hair, J. F., Black, W.C., Babin, B.J., Anderson, R.E Tatham, R.L, (2006).

Multivariate data analysis, Upper Saddle River. Vol 6.

Hayashi, Fumio (2000). *Econometrics. Princeton University Press.* [ISBN 0-691-01018-8](#).

HBSC, (2008). Currie C, Gabhainn SN, Godeau E, Roberts C, Smith R,

Inequalities in young people's health: Health Behaviour in School-aged Children international report from the 2005/2006.

Heo J, Oh J, Subramanian SV, Kim Y, Kawachi I, (2014) Addictive Internet Use among Korean Adolescents: A National Survey. PLoS ONE journal 9(2): e87819.

Isaac X. (2008), From Degradation to Redemption. Xlibris Corporation, ISBN 10: 1436332982.

- Jang S. H. and Park Y. J., (2010). Effects of Teenagers' Ego-Identity, School Life Adaptation, and Stress on Internet addiction, *The Journal of Humanities*, vol. 15, no. 2, 2010. pp. 195-226.
- Jeongmin L, Boram Ch, (2015) Effects of Self-Control and School Adjustment on Smartphone Addiction among Elementary School Students, *International Journal of Contents*, Vol. 11, No.3.
- Jing, Q., Yong, L, (2010). Empirical Study on the Reading Therapy of University Student's *Internet Addiction in Academic Libraries [J]. Library Work and Study* 4, 030
- Kim H, (2013). Exercise rehabilitation for smartphone addiction. *Journal of exercise rehabilitation* 9, 500
- Ko K, Lee M, Kim Y, (2012). A research on addictive use of smartphone by university students, *Journal of Digital Contents Society*, 13.
- Kwon M, Kim D, Cho H, Yang S, (2013) the Smartphone Addiction Scale: Development and Validation of a Short Version for Adolescents. *PLoS ONE* 8(12): e83558. doi:10.1371/journal.pone.0083558.
- Kim D, Lee Y, Jee J, Nam JK, Chung Y (2014) Development of Korean Smartphone Addiction Proneness Scale for Youth, *PLoS ONE* 9(5): e97920. doi:10.1371/journal.pone.0097920.
- Maddux JF, Desmond DP, (2000). Addiction or dependence? *Addiction*. 2000;95(5):661– 665. *US National Library of Medicine National Institutes of Health*
- McLuhan M, (1964). *Understanding Media: the Extensions of Man* (1st ed.).

McGraw-Hill Book.

Min B.S, (1991). The Effects of the School Adjustment and Self-Conception on School Record, Master's thesis, Hongik University.

Morrill T, Torrey B, (2009). Cell Phone Use and Psychosocial Development among Emerging Adults. All Graduate Theses and Dissertations. Paper 748.

National Information Society Agency, (2010), *Informatization White Paper 2010*. 35p
National Information Society Agency. (2012), Internet Addiction Survey 2012 118-119p.

Net Addiction, (2013). Parenting in the Digital Age by Dr. Kimberly S. Young at *Netaddiction.com*. Retrieved from:

<http://netaddiction.com/childrenonline/>.

NISA, (2013). The National Information Society Agency 2013. The survey on Internet Addiction. Seoul, South Korea: The Korean Ministry of Public Administration.

NSO, (2016). National Statistic Organization. *Statistic data 2016*.

NSO, Mongolian National Statistic Organization, Mongolian Statistic Information System Retrieved from: www.1212.mn

Qiang Xu, Jeffrey Erman, Alexandre Gerber, Z. Morley Mao, Jeffrey Pang, and Shobha Venkataraman, (2013). Identifying Diverse Usage Behaviors of Smartphone Apps by Proceedings of IMC, *The ACM Digital Library is published by the Association for Computing Machinery*

Open Society Forum, (2010). A Study on the Children Labor in Mongolia.

- retrieved from http://forum.mn/res_mat/child_labor_mon.pdf
- Rainie, L., & Keeter, S. (2006). Cell phone use. *Pew Internet & American Life Project*.
- Roberts V.J, Rideout D.F, Foher U.G, (2010). Generation M2: Media in the Lives of 8-18-Year-Olds: *A Kaiser Family Foundation Study. Menlo Park, Calif.* Retrieved from <https://kaiserfamilyfoundation.files.wordpress.com/2013/01/8010.pdf>
- Salehan M, Negahban A, (2013). Social networking on smartphones: When mobile phones become addictive. *Computers in Human Behavior*, 29(6).
- Soshensky R, (2009). Music Therapy and Addiction, *Music Therapy Perspectives* (ISSN: 0734-6875); *Volume 19, No. 1, pp. 45-52; 2001*
- Statista Inc, (2013). Distribution of time spent on mobile apps in the United States, Retrieved from: <https://www.statista.com/statistics/319652/us-mobile-app-time-distribution-category/>
- Statista Inc, (2016). Distribution of time spent on iOS and Android apps in South Korea, Retrieved from: <https://www.statista.com/statistics/275301/distribution-of-time-spent-ios-and-android-apps-in-south-korea/>
- Telegraph technology journal, (2016). Most important inventions of the 21st Century, Retrieved from: <http://www.telegraph.co.uk/technology/2016/03/09/most-important-inventions-of-the-21st-century-in-pictures/>.

- Tessa Jones, (2014). Students' Cell Phone Addiction and Their Opinions, The
Elon Journal of Undergraduate Research in Communications .Vol. 5,
No. 1.
- WHO, 1964. "[Management of substance abuse: Dependence Syndrome](#)". *WHO
Expert Committee*.
- Wookjoon S .(2016). A Study on the Internet Addiction in the Smart Era.
Education 2016 Vol.127
- World Bank, (2012). Poverty Level in Mongolia 2012
- World Health Organization, (2016). Adolescent definition retrieved from:
[http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/e
n/](http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/en/).
- Wu AM, Cheung VI, Ku L, Hung EP (2013) Psychological risk factors of
addiction to social networking sites among Chinese smartphone users.
Journal of Behavioral Addictions 2(3):160–166.
- Yeongcheol E, (2016). Teenager's Addiction to Smartphones and its integrated
Therapy Method. *Advanced Science and technology Letters Vol.132,
Healthcare and Nursing 2016. Pp.116-122*
- Yong-Sook K, Ji-Young P, (2013). A Study on the Perception of Preliminary Early
Childhood Teachers on Young Children's Addiction to Media and its
Alternatives *International Journal of Bio-Science and Bio-Technology*
Vol.5, No.5 (2013), pp.47-56,
- Young K.S, 1999. Internet addiction: Symptoms, evaluation and treatment.
Innovations in Clinical Practice, 17.

Appendix

A Questionnaire of Smartphone Addiction to Take a Further Policy Action among Adolescents

Respondents must aged from 13 to 17 years old

Survey objective: This is study aims to determine smartphone addiction rate and define the needs to take action among adolescents in the further in Mongolia. The survey consists of 39 questions and researcher read every single question to adolescents aged 17 to 13 and fill out completely. We do not leak your personal information in accordance with "Mongolian Law on Statistics" and "Law on privacy". Also, we will not use the research results without other objectives and will not imply your personal information in the research result. Please answer correctly and complete all of the survey questions!

Questionnaire number: _____ cell phone number: _____

General Information

1. How old are you? _____

2. Gender: 1. Male 2. Female

3. How many family members do you have your family? _____

4. With whom do you live? (Parental marital status):

Parents	Grandparents	Siblings	Uncle and Aunt	Law in brother and sister	Relatives

5. What is paternal education level?

1. Primary school
2. High school education
3. Bachelor's degree
4. Master's or Doctor degree

6. What is maternal education level?

1. Primary school
2. High school education
3. Bachelor's degree
4. Master's or Doctor degree

7. Disabled or not (please check without ask the question):

1. Yes
2. No

8. What is your school grade?

1. Primary school
2. Secondary school
3. High school

9. What is your school type?

1. Private school
2. Public school
3. University
4. I don't attend school

10. For what do you spend most of your time when you use the smartphone? (You can check one or more)

- ☐ SNS (Facebook and Twitters)
- ☐ YouTube and movie websites

- ☐ Google, educational application, and website
- ☐ Game application
- ☐ Instant message application
- ☐ Calling and text message
- ☐ Other _____

11. Please indicate to what extent you agree or disagree with each statement about THE USE OF SMARTPHONE:

		Strongly disagree	disagree	Neutral	Agree	Strongly agree
Items						
1	I use my smartphone without my parent's permission	1	2	3	4	5
2	I have spent a lot of time on social media (for example Facebook, YouTube, Messenger chat)	1	2	3	4	5
3	I get cyber bullying on online (for example You are fat, tiny, ugly, stupid etc.)	1	2	3	4	5

12. How many friends do you have on a social network (Facebook)? ____

13. How many hours do you use your smartphone a day? _____

14. Please indicate to what extent you agree or disagree with each statement about SCHOOL ENVIRONMENT:

	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I am satisfied with my relationship between peers	1	2	3	4	5
2	I have joined many clubs and sports activity for after class at school	1	2	3	4	5
3	My academic achievement is very good (please rate your academic achievement yourself)	1	2	3	4	5
4	My school has permission to use a smartphone at school	1	2	3	4	5
5	My peers have the discriminatory attitude with their smartphone price	1	2	3	4	5

15. Please indicate to what extent you agree or disagree with each statement about THE AWARENESS OF SMARTPHONE:

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1 I know about negative effect of overuse on smartphone	1	2	3	4	5
2 I have experience of smartphone addiction prevention education	1	2	3	4	5
3 I have participated in the programs to use a smartphone appropriately and to prevent from crime myself	1	2	3	4	5

16. What is the most effective source do you like to get information for smartphone addiction?

- ☐ Through school
- ☐ Through family
- ☐ Through internet and smartphone myself
- ☐ TV and newspaper
- ☐ Other _____

17. What is the most effective way to protect from smartphone addiction and its negative effect?

- ☐ Through a training for children to understand the negative aspects at school
- ☐ Parents should teach about the smartphone seriousness for children
- ☐ The children should control themselves their behavior of smartphone
- ☐ The school is prohibited from using the smartphone and internet
- ☐ Other _____

18. Please indicate to what extent you agree or disagree with each statement about SMARTPHONE ADDICTION SCALES:

Items	Strong ly disa gree	Dis agr ee	Weakl y disa gree	Weak ly agr ee	Ag ree	Stro ngly agr ee
1 Missing planned work due to smartphone use	1	2	3	4	5	6
2 Having a hard time concentrating in clas s, while doing assignments, or while wor king due to smartphone use	1	2	3	4	5	6
3 Feeling pain in the wrists or at the back of the neck while using a smartphone	1	2	3	4	5	6

4	Won't be able to stand not having a smartphone	1	2	3	4	5	6
5	Feeling impatient and fretful when I am not holding my smartphone	1	2	3	4	5	6
6	Having my smartphone in my mind even when I am not using it	1	2	3	4	5	6
7	I will never give up using my smartphone even when my daily life is already greatly affected by it	1	2	3	4	5	6
8	Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	1	2	3	4	5	6
9	Using my smartphone longer than I had intended	1	2	3	4	5	6
10	The people around me tell me that I use my smartphone too much.	1	2	3	4	5	6

초록

A Study of Smartphone Addiction among Adolescents in Mongolia

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첨단 기술이 인구를 통해 많은 새로운 발전과 서비스를 창출했지만, 어두운 면은 사회에서 나타나고 있다.

기술의 어두운 면은 개인 정보 보안 문제, 과용, 사이버 괴롭힘 등 여러 가지 방법으로 일상 생활에 영향을 미치고 있다. 청소년은 스마트폰을 사용하여 가족 및 친구들과 통신하고 보안을 제공하고 새로운 정보 및 교육을 받을 뿐만 아니라 동시에 스마트폰에 중독되고 있다.

본 연구는 회귀 분석 방법을 통해 몽골 청소년들에게 가장 중대한 스마트폰 중독에 영향을 미치는 요인을 규명하는 것을 목적으로 한다.

이전의 연구들은 사회 경제적, 심리적 및 개인적 특성에 기반한 수많은 영향 요인들을 보여 주었지만, 이 연구는 몽골 사회의 사회적 요인들에 초점을 둔 차별화를 가지고 있다.

스마트 폰 중독은 연구 분야에 있어 스마트폰 중독 척도 (Smartphone Addiction Scale)로 측정 할 수 있다. 연구대상은 13 세에서 17 세 사이의 청소년으로 최소 2 개월 이상 스마트폰을 소유하고 있다. 본 연구는 스마트폰의 남용을 조사하고 이해하기 위해 개인 인터뷰 조사에서 수집한 경험적 자료에 기초한 청소년 요인에 영향을 미치는 요인을 조사하고 있다.

2016년 몽골 중학교와 고등학교를 대상으로 무자위 선정한 21개 학교를 상대로 설문조사를 실시했다. 이 논문은 회귀 분석에 의해 383 명의 참가자로 구성된 경험적 연구이다. 이 연구는 가족, 학교, 스마트 폰 사용, 스마트 폰 중독 및 강박 행동에 대한 인식 사이의 연관성을 조사하고 있다. 그 결과 스마트 폰 중독은 수도의 전염병 문제라고 볼수 있다. 이러한 영향 요인을 이해함으로써 몽골 정부 기관 및 정책 담당자는 청소년의 스마트 폰 및 인터넷 중독에 대한 계획을 수립하고 시행할 수 있다.

마지막으로 이 연구는 합리적인 설명을 제공하고 스마트폰 중독 문제에 대한 정책 지침을 3단계로 제시하고 있다.

키워드 : 스마트 폰 중독, 인터넷 중독, 청소년, 십대, 몽고 사회, 스마트 폰 사용, 중독의 IT 정책